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TUBERCULOSIS

OF

LIVESTOCK AND POULTRY

WITH GENERAL INFORMATION

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Secretary of Agriculture

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TUBERCULOSIS OF LIVESTOCK AND POULTRY

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BUREAU OF ANIMAL INDUSTRY

Tuberculosis is a chronic, transmissible disease of man, domestic animals and poultry. It was originally known in history as Phthisis, a disease affecting man and was subject to many theories as to the origin and cause. Due to the fact that it was the most prevalent disease of man, it was better known than other diseases and subject to more intensive study and investigation. Tuberculosis dates back many years, and has been found in Egyptian Mummies over 5,000 years of age.

Tuberculosis received the name from the early discovery that in the development of the disease in man there is a definite or peculiar character in the formation of certain granulations, nodules or tubercles in the lungs or other organs of the body which have a tendency to undergo cheesy degeneration. Tuberculosis in man was commonly known as pulmonary consumption, or wasting disease and in cattle called pearl disease.

CAUSE OF TUBERCULOSIS

The initial investigation concerning the cause and effect of tuberculosis was concerned with the disease in man and it was not until 1843 to 1865 that real progress was made in the determination of the cause. Villemin, one of the early investigators of the cause, proved by means of experimentation that tuberculosis was transmissible from man to animals and from animals to animals.

Considerable controversy developed over these experiments through the use of rabbits and guinea pigs and in 1868 Chauveau, another leading investigator, declared that it was proved that the identity of tuberculosis was of virus origin. Through methods originated by Pasteur and perfected by Dr. Robert Koch the cause of tuberculosis was discovered in 1882, and in his honour it was named Koch's Bacillus Tuberculosis.

It is a rod-shaped germ and is now identified by the name mycobacterium tuberculosis. In 1896 Dr. Theobold Smith discovered that there is a difference in the character of the germ, depending on its origin, that is, there is the human type, bovine type, and avian type.

During all these periods of experimentation and research, the transmissibility of human tuberculosis to cattle and bovine tuberculosis to man was discussed with a fervor unsurpassed in the history of medicine.

Dr. Koch in his early investigations taught that bovine tuberculosis is identical to human tuberculosis and is thus a disease transmissible to man. In 1901 Dr. Koch made a statement before the British Congress of Tuberculosis diametrically opposed to his former teachings. In 1902 Dr. M. P. Ravenel, a physician in Philadelphia, Pennsylvania, who was associated with the Laboratory of the Pennsylvania Livestock Sanitary Board, gave a report of his study, investigation, and experimentation on the Intercommunicability of Human and Bovine Tuberculosis before the Pathological Society of Philadelphia. Dr. Ravenel acknowledged the advice and assistance of Drs. Leonard Pearson and S. H. Gilliland and the following quotation from his conclusion was presented to the above society:

"The evidence at hand forces us to conclude that human and bovine tuberculosis are but slightly different manifestations of one and the same disease, and that they are intercommunicable. Bovine tuberculosis is, therefore, a menace to human health.

"In the past there has probably been a tendency to exaggeration, but however great this may have been, it does not now justify any attempt at belittling the risk and it is folly to blind ourselves to it.

"The eradication of bovine tuberculosis is amply justifiable from a purely economical standpoint; viewed in its bearing on human health, it becomes a public duty."

INFLUENCES

Influences, such as insufficient and improper feeding of food deficient in nutrients, dampness, poorly ventilated and dirty stables, lack of exercise in the open air and sunshine, which is very essential to the health of cattle, have a tendency to reduce the vitality of the animals and the resisting powers of the body tissues are lowered and predispose the animal to the infection of the mycobacterium tuberculosis.

IMPORTANCE

The Eradication—Or controlling of bovine tuberculosis of the cattle in the United States, especially the dairy cattle, has been one of the prime factors in the development of superior dairy cattle and also one of the means of aiding the dairyman in maintaining an economically producing herd. Successful animal husbandry is dependent primarily on healthy livestock, and this can only be maintained by exercising such remedial measures as are necessary to control diseases, and the first of such measures was the introduction of the means of detecting tuberculosis in cattle. Subsequently, the

controlling of tuberculosis in other livestock and poultry received special attention.

Milk—Milk from cows or goats affected with mammary gland tuberculosis or tuberculosis in other parts of the body of the animal may be extremely rich in the mycobacterium. This milk, when ingested, is highly infectious for calves, pigs, chickens, colts, kids, dogs, cats and young children.

The sources of such infected milk and the by-products, as cream, butter, skimmed milk and cheese can only be eliminated by systematic tuberculin testing and physical examination of the cattle or goats.

Human Tuberculosis—Cattle, hogs, sheep, poultry, milk and by-products are some of man's most important sources of food, and through this close relationship, the health of the food producing animals and poultry is of prime importance to human health. Due to the transmissibility of bovine tuberculosis to man, in years gone by, many cases of tuberculosis among children were traceable to the use of milk from tuberculous cows and since the tuberculin testing of dairy cattle is now an accepted fact, with the elimination of reacting cattle from which the milk was contaminated with the mycobacterium tuberculosis, and the pasteurization of milk, the infection of tuberculosis among children has ceased to become a health problem of importance.

The reduction in the prevalence of tuberculosis among human beings brought about by the control of tuberculosis in cattle has been reflected more particularly in the extra-pulmonary types of tuberculosis in children and adults, particularly that type which affects the gastro-intestinal and glandular systems.

In the last twenty years, there has been a 70 per cent decrease in the tuberculosis death rate of people, partly due to the tuberculin testing of cattle, meat and milk inspection services, cooking and boiling of foods properly and through the various health campaigns of the people in general and the livestock owners.

OCCURRENCE

The prevalence of tuberculosis among cattle, other animals and poultry has been brought about by the development of the intensive dairy and poultry industry, increased traffic in livestock, the movement of infected cattle or poultry into uninfected herds or flocks and the development of large dairies and poultry flocks close to the centers of population. The maintenance of large dairy herds necessitated

continuous replacement of cattle not meeting dairy requirements and frequently these large interchanges of cattle spread tuberculosis from herd to herd.

No tuberculosis existed among the buffalo or cattle on the plains in early American history.

HOW ANIMALS AND POULTRY BECOME INFECTED

The principal ports for the entrance of the mycobacterium tuberculosis are undoubtedly the respiratory and the digestive traets and it is through these modes of entrance that tuberculosis has its insidious beginning and eventually develops into a chronic manner and preserves this character until fatal termination.

SUSCEPTIBILITY

Susceptibility to tuberculosis varies according to the species of the animal, for the reason that certain animals possess extraordinary natural resistance to the infection, also the individual susceptibility is not the same in all animals.

Breed—No breed of cattle is immune from becoming infected with tuberculosis.

Heredity—Heredity plays no important role in the predisposition nor in the dissemination of tuberculosis, although tuberculosis may be transmitted from the mother to the unborn calf if the uterus of the mother is diseased. In exceptional cases and also after sucking the diseased mother, it is a known fact that very young calves may react to the tuberculin test and disclose lesions when slaughtered.

Cattle—Are susceptible to infection at all ages, although calves are more so than older animals. The infection occurs directly or indirectly through association with infected animals which discharge the mycobacterium tuberculosis in their excretions. Cattle with open tuberculosis lesions in the lungs are very dangerous to surrounding cattle because the coughing exudate is highly infectious. Probably in the majority of cases, the infection occurs through the medium of contaminated food or the air which may be infected from the expired secretions from the infected lungs of cattle during the act of coughing, which is very characteristic of cattle infected with pulmonary tuberculosis.

The milk from badly infected cows, especially in cases of udder tuberculosis, is highly infectious to calves, and causes tuberculosis in the intestinal tract of the calves. Feeding calves milk from skimming stations where pasteurization is not practiced must be considered a

very dangerous procedure. Drinking water in troughs or vats may be contaminated by infected cattle, and the other cattle drinking this water may become readily infected with tuberculosis.

Swine—During the practice of running hogs in the barnyard or feeding lot with cattle, tuberculosis in hogs was quite prevalent due to excretions of the cattle being infected with the mycobacterium tuberculosis. Also, they are readily infected through the ingestion of germ laden feed, milk or skimmed milk from infected cattle. The eradication of bovine tuberculosis has greatly diminished tuberculosis in swine. Hogs are very susceptible to avain tuberculosis and become very readily infected if they have direct contact with poultry which are affected with tuberculosis. Poultry should not be allowed to contaminate the feed and water of hogs through their droppings by having access to the hog yards or hog house.

Hogs should not be allowed to consume slaughter house offal from tubercular cattle or the carcasses of poultry which may be contaminated with tuberculosis.

The feeding of uncooked garbage to the hogs may result in the hogs becoming infected with the human type of the tuberculosis germ through the careless disposal of infective material, body excretions, or sputum from people affected with active tuberculosis, or the hogs may become infected with the avian tuberculosis germ by the disposal of tubercular poultry in garbage.

Poultry—The avian type of the tuberculosis germ affects chickens, turkeys, pigeons, ducks, geese, guinea chickens, and pet birds. The infection in poultry generally takes place through the infected droppings contaminating the feed and water of healthy birds. Poultry are rarely affected with bovine tuberculosis.

The avian mycobacterium do occasionally infect cattle, sensitize them, causing a reaction when the cattle are tuberculin tested. It is therefore important that poultry on farms be maintained separate and not permitted to associate, directly or indirectly, with the cattle.

Goats—Tuberculosis of goats may be considered rather rare, but they may contract tuberculosis through association with cattle and also possibly from poultry. On the other hand, goats may be the original source of infection of tuberculosis in the cattle or the poultry, and it is not advisable to maintain goats with cattle or poultry.

Sheep—Tuberculosis is relatively rare and runs a somewhat chronic course, generally involving the lungs.

Horses—Tuberculosis is very infrequent, however, in Pennsylvania a number of cases have been found and the infection, no doubt, was

contracted from cattle or by being housed in the barn where infected cattle were maintained.

Cats and Dogs—Tuberculosis does occur, and they may be infected with the bovine tuberculosis bacillus from drinking infected milk or eating infected meat or they may become infected with the human type of mycobacterium tuberculosis by close association with people affected with tuberculosis.

Rabbits and Guinea Pigs—Spontaneous tuberculosis is very rare in tame rabbits or guinea pigs, although these animals are very susceptible to artificial infection as produced in experimental laboratories. When tuberculosis does occur it is usually due to feeding infected milk or contaminated food or bedding, either of bovine or human origin, and also may be caused by tuberculous caretakers, who expectorate on the feed or bedding.

Pigeons—May become infected if they associate with tuberculous chickens.

Rats and Mice—Are readily infected by inoculation with the avian mycobacterium tuberculosis or by eating the carcasses of tuberculous poultry. They are rarely affected with tuberculosis of bovine origin.

Wild Animals and Birds—From present knowledge wild animals and birds never contract tuberculosis spontaneously, but when in captivity they are susceptible. In zoological parks and menageries, the large felines, as tigers, lions, panthers, and jaguars, also foxes, may become infected with tuberculosis if they are fed meat or milk from tuberculous cattle. Tuberculosis has been found in bears, camels, elephants, parrots, and other tropical birds in captivity.

Fish or the Reptile Family—True mammalian or avian tuberculosis does not affect fish or the reptile family due to their cold-blooded nature, although they are subject to a disease somewhat similar to tuberculosis.

SYMPTOMS

COURSE IN ALL ANIMALS AND POULTRY

Cattle—The course of development of the tuberculosis lesions is slow and in a great number of cases the symptoms of the disease may pass unnoticed for a long time, even years, and the animal or animals may appear to be in perfectly good health. It is only after some important organ becomes badly involved that a possible diagnosis can be made by a physical examination. However, the tuberculin test will detect tuberculosis in the early stages of development before any organs are extensively involved.

Poultry—The course of the disease is slow and the symptoms are not noticed in young birds, generally noticeable in poultry from two to three years of age, and is characterized by gradual emaciation, especially noticeable on the breast and is commonly spoken of as "going light." The muscles shrink leaving the bones practieally bare with considerable loss of weight. The comb, wattles and skin of the bird become pale and the feathers ruffled, the birds are listless, weak, and move about very little.

Swine—The course is very indefinite because the tuberculosis infection in swine is generally confined to the glands of the throat and digestive tract and is very difficult to diagnose on a physical examination for several reasons, the swine are not maintained on the farm for any great length of time, except the brood sows, the young swine being marketed when reasonably young and as a rule hogs are not known to be infected with tuberculosis until they are slaughtered at an abattoir having veterinary inspection and through this knowledge the hogs can be traced to the farms from which they originated and then the balance of the hogs may be subjected to a tuberculosis test.

Goats—Due to the rarity of tuberculosis the symptoms are not easily recognized.

Sheep—Chronic bloating may be caused by enlarged tubercular lymph glands.

Horses—In cases brought to our attention, tuberculosis was indicated by loss of weight and tired easily with a change in respiration extending over a period of a year.

PARTS OF THE BODY AFFECTED

Cattle—The lungs and associated lymph glands are the chief seat of the disease, however, all organs including the digestive and nervous systems may be involved. Pulmonary or lung tuberculosis is the most frequent form and manifests itself by vigorous coughing which in time may become feeble and soundless; the type of respiration may change in that it may be more frequent and more difficult; the general condition of the animal changes, the skin loses its elasticity, adheres more firmly to the body and is spoken of as "hide-bound"; the hair loses its luster, the animal becomes very much emaciated, that is, the muscles shrink; the appetite may vary considerably and if certain glands in the body are badly affected, periodical attacks of bloating occur; certain superficial glands of the body may become very large and easily recognized; tuberculosis of the udder may be

suspected by the indication of enlarged quarters of a tumorous nature with a corresponding enlargement of the mammillary lymph gland.

Poultry—The internal organs most frequently affected are the liver, spleen, intestines, lungs, and bones and other parts of the body are rarely involved. The liver of a chicken infected with tuberculosis generally shows extensive lesions or nodules of various sizes, is enlarged and may be pale in color. The spleen is frequently affected and presents the same appearance as the liver.

Hogs—Generally the lesions are confined to the lymph glands of the neck and the intestines. In generalized cases the lungs and other organs are affected.

Goats—The throat and lungs are the parts usually affected.

Sheep—The infection is practically the same as in other animals.

Horses—In the cases in Pennsylvania, the lesions were confined to the lungs and surrounding lymph glands.

TUBERCULIN

In 1890 Dr. Koch developed a product called tuberculin and it was first used as a remedy for tuberculosis in man. The injection of tuberculin caused a rise of temperature of the patient, and this observation led veterinarians to suspect that possibly this product could be used to diagnose tuberculosis in cattle. In 1891 Dr. Gutman, a Russian veterinarian, used tuberculin to detect tuberculosis in cattle and later was used on other animals and poultry and man.

In 1891 Dr. Leonard Pearson, Professor of Veterinary Medicine at the University of Pennsylvania, Philadelphia, Pennsylvania, went abroad to study tuberculosis and its diagnosis. When he returned to the United States, he brought back some of Dr. Gutman's tuberculin to be used later on cattle.

Tuberculin is a clear, sterile biological agent containing certain products derived from the growth of the mycobacterium tuberculosis on an artificial or synthetic culture medium. The diagnostic value differs according to whether the mycobacterium employed for the production of tuberculin is of the human, bovine, or avian type.

Tuberculin is manufactured under the supervision of the United States Bureau of Animal Industry and does not contain any type of living or dead organisms and is in no way injurious to the health of animals nor does it affect the meat or milk of cattle when administered; however when used on tuberculous animals it causes a reaction. This is of great value in detecting tuberculosis in the live animal.

EFFICIENCY OF TUBERCULIN

As an agent to detect tuberculosis in cattle, the diagnostic value must be considered remarkable when viewed from the tremendous difficulty encountered in tuberculin testing the cattle in the United States.

Many counties of certain states had a very high degree of bovine tuberculosis infection, but after repeated tests, this high degree of infection has been reduced to one-half of one per cent and lower proving that a systematic process of testing has radically reduced tuberculosis of the cattle in these particular counties.

The Federal and State Meat Inspection Service has been of inestimable value in tracing herds wherein tuberculosis exists and through the value of tuberculin such herds have been freed of tuberculosis.

TESTS FOR TUBERCULOSIS

The First Testing of Cattle—For tuberculosis in the United States was conducted by Dr. Leonard Pearson on March 16, 1892, on the herd of Dr. J. E. Gillingham, of Clairmont Farm, Villanova, Pennsylvania, using the subcutaneous or thermal test. Dr. Gillingham decided, in the interest of science, to prevent the spread of disease and to demonstrate the value of the tuberculin test, to subject his cattle to this experimental test and that all suspected and reacting cattle were to be killed. A number of cattle reacted to the tuberculin test and a post mortem examination was held on the reacting cattle and the detection of tuberculosis by the tuberculin test was amply verified and ably demonstrated. The post mortem examination was conducted by Dr. Pearson in the presence of a number of prominent veterinarians, leading physicians, farmers, dairymen, and other interested people who were concerned with the health of people and livestock.

This demonstration of the results of the test left no doubt in the minds of leading veterinarians and medical men that the test would indicate cattle infected with tuberculosis. This was an epochal event in the health history of the cattle in the United States. Other herds were later tested and the test for tuberculosis became the accepted method of determining if cattle were so affected.

The Subcutaneous Test—The first method of testing was known as the subcutaneous method. The principle involved in this test was the rise of the temperature of the cattle after the injection of the tuberculin if the cattle were affected with tuberculosis, and required an entire day for a veterinarian to conduct this test. This test was

used in the initial stages of the tuberculosis eradication campaign, and as the demands for the tuberculin testing became greater, another test was developed later, known as the intradermal test.

The Intradermal Test—This test consists of the injection of a small amount of tuberculin between the layers of the skin at the base of the tail and the vulva and is commonly known as the upper and lower injection, and the interpretation of the results of the test are made by the veterinarian at the expiration of approximately 72 hours after the injection.

The Ophthalmic Test—In which a small amount of special tuberculin is instilled into the eye and after a certain period of time an inflammatory reaction will be shown if the cow is affected with tuberculosis, but due to the many conditions involving the eye, this test is not adapted for large scale tuberculin testing.

All tuberculin tests to be considered official must be authorized by the Pennsylvania Bureau of Animal Industry and conducted only by an accredited veterinarian.

Poultry—The avian type tuberculin is used. The skin of the wattle and comb is the seat of injection and the interpretation of the test if made by the veterinarian at a designated time.

Hogs—The type of tuberculin used is dependent upon the veterinarian's diagnosis of the hogs being affected with bovine or avian tuberculosis. The edge of the hogs ear is generally used for the seat of the injection.

Goats—Bovine tuberculin is generally used and the test is conducted in the same manner as on cattle.

Sheep—Bovine tuberculin is used the same as on cattle.

Horses—Bovine tuberculin is used, with application of the test made on the lower eye-lid.

PLANS OF TESTING

The Early Pennsylvania Plan—In 1895 the Pennsylvania Legislature enacted legislation establishing the State Livestock Sanitary Board, giving the Board authority to take such measures as were necessary to eradicate and prevent the spread of contagious or infectious diseases among the domestic animals of Pennsylvania, and it was under this act that the Pearson Plan for the eradication of tuberculosis of cattle in Pennsylvania was carried out.

In 1896 Dr. Pearson outlined a plan for the tuberculin testing of cattle and it was then known as the original Pennsylvania Plan. In memory and honor to this internationally known and highly respected Pennsylvania veterinarian, it should be known as the Pearson Plan.

This plan has never been replaced in its entirety, but has been modified to meet the many changes that have taken place since the introduction of tuberculin and was successful until 1919.

Under this plan a herd owner voluntarily requested the tuberculin testing of his cattle, either by a veterinarian employed by the Commonwealth or by his local veterinarian, the joint appraisement of reactors, and their slaughter. Initially the carcasses were buried or rendered and the Commonwealth paid the owner a certain amount of indemnity. This plan was commonly known as the "test and slaughter plan."

Individual Accredited Herd Plan—The Accredited Herd Plan was adopted in 1918 because it was a universal plan applicable to the entire United States for the prevention, control, and repression of tuberculosis, and involved the principles of the Pearson Plan. Under this plan the owner voluntarily agrees to employ his veterinarian to tuberculin test his cattle at his expense, the removal of reacting cattle for slaughter under official supervision, and cleaning his barn and premises so that the same can be disinfected under Bureau supervision. If the herd passes two annual negative tuberculin tests, it is considered accredited for one year and is classed as an Individual Accredited Herd. Retests are conducted, in case reactors are disclosed, at a time considered necessary by the Bureau.

On December 5, 1940, it was unanimously adopted by the United States Livestock Sanitary Association and approved by the Bureau of Animal Industry, United States Department of Agriculture that "An Individual Accredited Herd is a tuberculosis-free accredited herd of cattle in which the entire herd has passed two (2) negative, successful annual physical examinations and tuberculin tests. Herds in which infection occurs shall be quarantined and shall be required to pass three (3) negative tuberculin tests not less than 60 days apart to lift quarantine; and further, such herds shall not be accredited until they shall have passed a tuberculin test without evidence of reaction, not less than 12 or more than 14 months following the test on which infection was disclosed; such physical examinations and tuberculin tests shall be applied by an accredited veterinarian or by a veterinarian regularly employed by the State or United States Bureau of Animal Industry."

Under this plan of tuberculin testing, a good many herds were tested in Pennsylvania and in various States in the Union. However, it was learned that in order to control or eradicate tuberculosis in cattle, it would be necessary and highly desirable that all the cattle

in a certain section would have to be tuberculin tested at one time, and this led to a plan whereby all the cattle in certain townships in the various counties of the States were tuberculin tested; from this thought, the Modified Accredited Area Plan was developed.

Modified Accredited Area Plan or National Plan—All the cattle in a certain township are tuberculin tested until eventually the cattle in an entire county are tested and then if the number of reactors in the county do not exceed one-half of one per cent of the entire cattle population in that county, the county becomes what is known as a Modified Accredited Area. This plan was adopted in 1922 and the first tuberculin testing in Pennsylvania under this plan was conducted in Mercer County in 1923 and Mercer became the first county to qualify as a Modified Accredited Area in 1924. During the following years the cattle in other counties in Pennsylvania were tuberculin tested and became Modified Accredited Areas, until the last herd was tuberculin tested in Lancaster County on May 14, 1935, and the next year, on November 1, 1936, Lancaster County became the last county in Pennsylvania to qualify as a Modified Accredited Area.

While the cattle were being tuberculin tested in Pennsylvania, the same procedure was being carried out in the other States of the Union, and the first State in the Union to be considered as a Modified Accredited Area was North Carolina. The last State to qualify was California on December 2, 1940. In addition, the territories of Puerto Rico and the Virgin Islands have been declared Modified Accredited Areas.

Under the Modified Accredited Area Plan after a county is accredited, three or six years, depending upon the degree or percentage of infection in the cattle, elapse before the cattle in the county are again tuberculin tested, and this work is done by Bureau veterinarians in conjunction with the practicing veterinarians of the respective counties employed by the Commonwealth and Federal Government.

The herds in which reactors occur, are considered infected herds and are quarantined and shall be required to pass three negative tuberculin retests not less than sixty days apart to lift the quarantine. The herd is not again tested until the next three or six year tuberculin test is conducted in the county in which the infected herd is located.

However, should an owner of a herd not desire to wait until the regular three or six year test is conducted he has the privilege of requesting an authorization from the Bureau of Animal Industry for his veterinarian to conduct the special retest. He has also the privilege of transferring the tuberculin testing of his cattle from the

Modified Accredited Area Herd Plan to the Individual Accredited Herd Plan and request that his veterinarian be authorized to conduct the tuberculin testing under this plan.

REACTORS

When cattle react to the test for tuberculosis, the veterinarian places a quarantine tag in the left ear of the reactor and brands the reactor with a hot branding iron, the letter T on the left cheek and in addition quarantines the balance of the herd to be subjected to necessary retests. The reacting cattle are disposed of and slaughtered under specific authorization of the Bureau of Animal Industry, members of the balance of the herd cannot be disposed of without authorization. The purpose of this regulation is to hold the balance of the herd intact subject to the necessary retests in order to avoid the possibility of infecting other herds.

Reacting goats and hogs are handled the same as cattle with the exception, that generally in hogs, the balance of the hogs are not retested but disposed of under inspection. In poultry, if the indications from the test point to an extensive outbreak, the entire flock should be slaughtered; and the diseased birds disposed of by burning or burying deeply.

APPRAISAL

Reacting cattle are appraised at their market value by the representatives of the Pennsylvania Bureau of Animal Industry or the United States Bureau of Animal Industry and the owner or his agent.

Reacting goats, horses, hogs, and sheep are subject to Commonwealth Appraisal only.

Reacting poultry are not subject to appraisal.

DISPOSAL

Arrangements are made through licensed livestock dealers and the owner for the disposition of such cattle at an abattoir under State or Federal supervision, and the owner receives from the butcher or dealer a sum of money, dependent upon the physical condition of the reactors, providing the carcass of the slaughtered reactor passes inspection for human consumption.

QUARANTINE AND RETESTS

The remaining members of an infected herd are held under quarantine subject to the rules and regulations of the Bureau of Animal Industry governing the retesting of infected herds. However, no retests are conducted within sixty (60) days of the date the reacting cattle were disclosed.

CLEANING THE PREMISES

After the reacting cattle have been removed from the farm, the herd owner is required to thoroughly clean the barn, feeding and watering facilities, yards, and sheds so that same can be disinfected under bureau supervision.

DISINFECTION

The bureau has for this purpose power sprayers and use a disinfectant that is approved by the United States Bureau of Animal Industry.

INDEMNITY FOR REACTORS

The purpose of paying indemnity by the Commonwealth and Federal Government is to compensate owners for animals condemned to prevent the spread of disease. Information concerning the method of computating the amount of State and Federal Indemnity may be had by writing to the Bureau of Animal Industry, Harrisburg, Pennsylvania.

The Commonwealth pays indemnity to owners of reacting grade and pure-bred, registered cattle, goats, hogs, sheep, and horses, but does not pay indemnity for reacting poultry.

The Federal Government pays indemnity on reacting grade cows and pure-bred registered cows and bulls only, but does not pay indemnity for reacting grade bulls, steers, goats, hogs, sheep, horses, and poultry.

SANITATION

The maintenance of healthy and profitable livestock and poultry is dependent upon management with due regard to sanitation. Cattle barns, hog houses, and poultry houses should be constructed so as to be easily cleaned, to have sufficient sunlight and ventilation. Barn yards, hog lots, and poultry yards should be graded for drainage. If colony poultry houses are used, they should be moved to new ground that has undergone cultivation so that the poultry do not have access to old infected soil. This likewise applies to small hog houses. Attention should be given cattle for body cleanliness. For hogs, concrete wallowing pits should be provided. Watering facilities should be of the individual drinking cup variety or running water in troughs that are easily cleaned daily. Drinking fountains likewise must be thoroughly cleaned and disinfected. If streams are used for watering purposes, the streams should be dammed or part of them enclosed so that the water does not become contaminated. Feeding utensils should always be clean.

BUYING REPLACEMENTS

The purchasing of cattle to replace reactors should receive special attention with regard to their health.

In a general way, the bureau has discontinued the issuing of tuberculosis health charts, but the purchaser has the right and privilege of knowing if the cattle intended for purchase originate from negative tuberculin tested herds. This information can be obtained from the owner of the cattle for sale or from the dealer, as all livestock dealers in Pennsylvania are required to keep records of their business transactions. If there is any doubt as to the health status of the animals to be purchased, it would be well to consult the District Agent of the section in which the cattle originate or write to the Bureau of Animal Industry, Harrisburg, Pennsylvania, furnishing the owners name and address and the ear tag number or registration data of the animal.

ASSEMBLING NEW HERDS

Before a herd is assembled, arrangements should be made with the District Agent or the Harrisburg office for the disinfection of the barn. The assembling of a new herd should receive the same close attention regarding the health of the cattle intended for assembling as should be exercised when purchasing replacements.

REGULATIONS

Pennsylvania—Cattle for addition to Individual Accredited Herds must originate from like herds in Pennsylvania or other states and are not required to be tuberculin retested. But if they originate from negative Modified Accredited Area Herds or other negative herds they should be retested.

Cattle for addition to herds tuberculin tested under the Modified Accredited Area Plan must originate from negative like tested herds, Individual Accredited Herds or negative herds under the Individual Accredited Herd Plan.

Cattle from infected herds in Pennsylvania cannot be sold for addition to negative tuberculin tested herds. Such cattle can only be disposed of for slaughtering purposes and by special permit issued by the Bureau of Animal Industry. For further information write to the Department of Agriculture, Bureau of Animal Industry, Harrisburg, Pennsylvania.

Interstate—Herd owners purchasing cattle in other states must have the cattle approved before shipment by the livestock officials of the state of origin as being eligible for shipment into Pennsylvania to comply with our regulations concerning tuberculosis and Bang's disease. These requirements may be had by writing to the District Agent or the Harrisburg office.

Cattle shipped from Pennsylvania into other states must comply with the regulations of the states of destination. Health charts will be issued by the Harrisburg office to accompany the cattle in transit.

GENERAL REMARKS

Problem Herds—are herds in which it has been difficult to eradicate tuberculosis due to the fact that the myeobaeterium tubereulosis is a wiley and formidable germ and lurks in many unseen places such as cracks and creviecs in the barn and is extremely resistent to external influences.

To eradicate tuberculosis in problem herds requires the wholehearted cooperation of the herd owner with the attending veterinarian to eliminate the causative faetors, and in some herds it is not always an easy or simple matter, but that does not dispute the fact that the tuberculin testing with a physieal examination is the best method of eradicating tuberculosis or exeuse us for negleeting to use the test.

The following factors should receive speeial consideration such as poor sanitation in and around the barn, dirty water troughs and drinking cups.

The watering of eattle in the barn by means of over-flowing water in the eonerete feed troughs should be discouraged, for the reason that if a eow is diseased she will eontaminate the water so that other cattle in the barn will beeome infeeted.

Cattle kept in the barn all winter, without exereise in the yards or field and denied the benefit of the direet rays of the sun, are more subjeet to infeetion, due to their vitamin deficiency.

Addition of eattle of unknown tubereulosis health status, or from past or present infeeted herds, cattle remaining in a herd with a history of being affeeted with tuberculosis are possible sourees of infection.

The feeding to ealves and cattle of milk from eows of unknown tuberculosis health status or unpasteurized milk is also a souree of infeetion.

Improper disposal of eareasses of cattle affected with tubereulosis on the farm whieh may have died or been slaughtered may possibly eontaminate the premises and be a souree of infeetion.

Cattle infected from the following sources may be sensitized to bovine tuberculin and react when tested, so it is very important to consider every possible source of infection where bad breaks or continuous infection occur.

Cattle can be infected with the avian mycabacterium tuberculosis from chickens or pigeons having access to the cow barn where their droppings contaminate the feed and water.

People affected with tuberculosis may, through their sputum or body excretions, infect the cattle.

Hogs affected with bovine or avian tuberculosis must be considered a source of the tubercular infection in cattle.

Goats, if tubercular, may be a source of the infection.

Due to the transmissibility of tuberculosis, it is very essential that all livestock be maintained in separate quarters on the farms.

Continual Tests—While the United States is a Modified Accredited Area, there is still much work to do and naturally, to reduce the tuberculosis infection in cattle to a greater extent it is essential and necessary to continue the good work by tuberculin testing the cattle periodically. If we relinquish our efforts, sooner or later the tuberculosis infection among cattle will be as great as before the eradication campaign started.

PROGRESS OF ERADICATION IN PENNSYLVANIA

Cattle tested in Pennsylvania in 1935:

Number tested	655,894
Number reacted	15,079

Cattle tested in Pennsylvania in 1942:

Number tested	547,711
Number reacted	1,756

In seven years the tuberculosis infection in cattle has been reduced 88.3 per cent.

Pennsylvania has been a Modified Accredited State since 1936 and the percentage of reactors has been reduced to one-half (½) of one (1) per cent, and lower, showing that by continuing the tuberculin testing throughout the state the cattle are comparatively free of tuberculosis.

From the above statistics it can be readily seen that this statewide disease control program has proved conclusively that by a coordinated program supported by cattle owners, agricultural agencies, veterinarians, physicians, and the public at large, tuberculosis and other diseases affecting livestock and poultry can be eradicated and controlled.